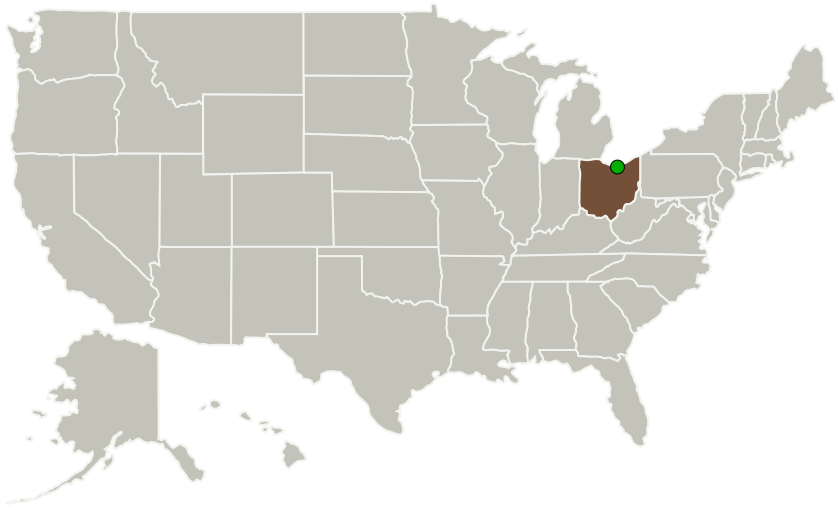
Distributed Contact Solver for 3D Dynamics Simulation of Drive Systems with Defects, Phase II

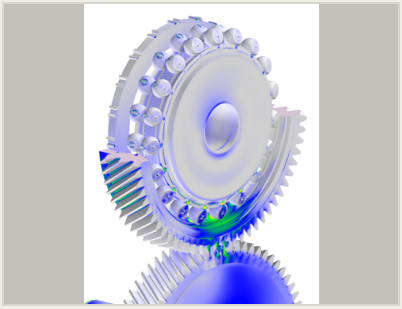
Completed Technology Project (2017 - 2019)

Project Introduction

We propose a novel computational method for generating data needed to create decision strategies for condition-based monitoring algorithms that can effectively differentiate between a healthy system and different types of defects in a damaged system. Currently, the only means available to generate this data are physical testing which is time consuming and expensive, and simplified computer models- either lumped parameter models or 2D models. The most advanced current computational model of drive systems with surface and crack damage can only be deployed on stand-alone computers. The existing contact algorithm relies on shared memory between CPUs, and quickly saturates memory bandwidth. We propose innovative modifications to the algorithm so that models may be efficiently deployed on very large clusters of computers connected by high speed networks. These changes will make possible realistic time-domain 3D modeling of drive systems with surface and crack damage.

Primary U.S. Work Locations and Key Partners





Distributed Contact Solver for 3D Dynamics Simulation of Drive Systems with Defects, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Advanced Numerical Solutions LLC	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Hilliard, Ohio
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations
Ohio

Project Transitions

April 2017: Project Start

April 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140921)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Advanced Numerical Solutions LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

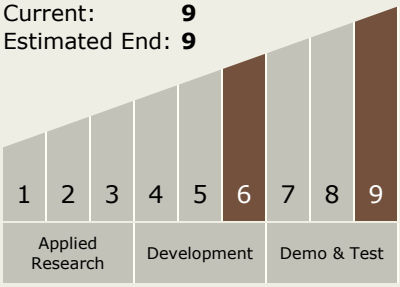
Carlos Torrez

Principal Investigator:

Sandeep M Vijayakar

Technology Maturity (TRL)

Start: **6**
Current: **9**
Estimated End: **9**



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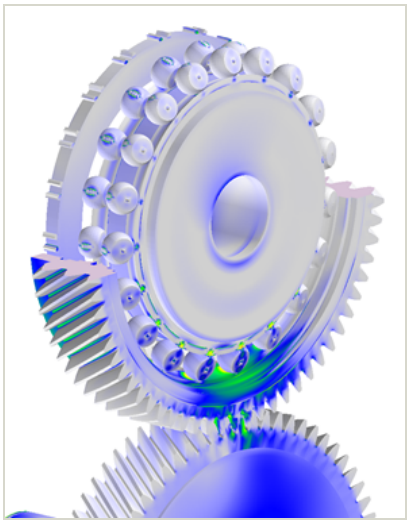
Images



Briefing Chart Image
Distributed Contact Solver for 3D Dynamics Simulation of Drive Systems with Defects, Phase II Briefing Chart Image
(https://techport.nasa.gov/image/128131)

Final Summary Chart Image
Distributed Contact Solver for 3D Dynamics Simulation of Drive Systems with Defects, Phase II
(https://techport.nasa.gov/image/125809)

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.4 High Performance Memories

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System